UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/047,978	01/13/2002	Steven Teig	SPLX.P0089	5041

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EXAMINER
WHITMORE, STACY

ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 11/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
	10/047,978	TEIG ET AL.
Office Action Summary	Examiner	Art Unit	
	Stacy A Whitmore	2812	MW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *13 January 2002*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-52* is/are pending in the application.

   4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5)☐ Claim(s) ____ is/are allowed.

6)☐ Claim(s) ____ is/are rejected.

7)☐ Claim(s) ____ is/are objected to.

8)☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☐ All   b)☐ Some *   c)☐ None of:

   1.☐ Certified copies of the priority documents have been received.

   2.☐ Certified copies of the priority documents have been received in Application No. ____.

   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

   a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *10* .

4)☐ Interview Summary (PTO-413) Paper No(s). ____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1.   Claims 27-34, and 38-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang(US Patent 5,784,289) in view of . Scepanovic et al. (US Patent 6,058,254).

2.   As for claims 27 and 38, Wang '289 disclosed the invention substantially as claimed, including a method of routing a plurality of nets in a region of an integrated circuit ("IC") layout, each net having a set of pins in the region, the method comprising:

partitioning the region into several sub-regions, wherein a plurality of edges/paths exist between said sub-regions [fig.'s 8-10];

for each particular net, identifying an edge-intersect/path-use probability for each particular edge/path that specifies the probability that a route for the particular net will intersect/use the particular edge/path, wherein a potential route for a particular net traverses the set of sub-regions that contain the particular net's set of pins [abstract; col. 2, line 65 – col. 3, line 11; col. 6, lines 43-67, especially lines 45-48 – here the wiring probability is shown to be the probability of the wiring passing through one edge; col. 7 – two pin nets]; and

using the identified edge-intersect/path-use probabilities to identify routes for the nets [col. 6, lines 23-46].

Wang did not specifically disclose a set of potential routes traverses the set of sub-regions.

Scepanovic disclosed a set of potential routes traverses the set of sub-regions [col. 5 – col. 6, line 5].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wang and Scepanovic because adding Scepanovics set of potential routes traversing the set of sub-regions would have improved Wang's method by allowing for quick routing which would save time for routing and save time for overall circuit design [see Scepanovic, col. 5, lines 1-14].

3.   As for claim 28 and 39, Wang '289 disclosed wherein, for each particular net, the edge-intersect/ path-use probability for each particular edge/path equals the number of potential routes of the particular net that intersect/use the particular edge/path divided by the number of potential routes of the particular net [col. 6, especially lines 63-65].

4.   As for claim 29 and 40, Wang '289 disclosed wherein identifying the edge-intersect/path-use probabilities for each particular net comprises:

identifying the set of sub-regions that contain each particular net's pins [abstract];

based on each particular net's identified set of sub-regions, retrieving the particular net's edge-intersect/path-use probabilities from a storage structure [abstract and col. 11, lines 1-12: the set of routes are retrieved from a storage structure because the program used to obtain them resides on a software program which is stored on a storage structure].

5.   As for claim 30 and 41, Wang '289 disclosed wherein identifying the edge-intersect/path-use probabilities comprises:

for each particular net:

identifying the set of potential routes for the particular net [abstract];

for each particular edge/path, computing the number of potential routes of the particular net that intersect/use the particular net/path [abstract; col. 6];

dividing the computed number of each particular edge/path by the number of potential routes of the particular net [abstract; col. 6].

6.   As for claim 31 and 42, Wang '289 disclosed wherein identifying the set of potential routes for each particular net comprises retrieving the set of routes from a storage structure [col. 11, lines 1-12: the set of routes are retrieved from a storage structure because the program used to obtain them resides on a software program which is stored on a storage structure].

7.   As for claim 32 and 43, Wang '289 disclosed wherein identifying the set of potential routes for each particular net comprises generating the set of routes after partitioning the IC region [abstract; col.'s 5-6].
As for claim 33 and 44, Wang '289 disclosed for each particular edge/path, computing a sum of the probabilities identified for the particular edge/path for all the nets [col. 6, lines 54-56];

using the summed probabilities for the edges/paths to predict congestion of the edges/paths [col. 6, lines 63-67; col. 7, lines 1-4];

routing the nets based on the predicted congestion of the edges/paths [col. 11, lines 1-12].

8.   As for claim 34 and 45, Wang '289 disclosed wherein using the identified probabilities to identify routes for the nets comprises:

using the edge-intersect/path-use probabilities to predict congestion of the edges/paths [col. 6];

based on the predicted congestion, identifying routes for nets [col. 6].

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9.   Claims 27 and 38 are rejected under 35 U.S.C. 102(e) as being anticipated by Scepanovic et al. (US Patent 6,058,254).

10.   As for claims 27 and 38, Scepanovic '254 disclosed the invention as claimed, including a method of routing a plurality of nets in a region of an integrated circuit ("IC") layout, each net having a set of pins in the region, the method comprising:

partitioning the region into several sub-regions, wherein a plurality of edges/paths exist between said sub-regions [fig. 4, sub-regions are the boxes identified by e.g. (j=0, I=0) or (j=0, I=1); col. 5, lines 25-27];

for each particular net, identifying an edge-intersect/path-use probability for each particular edge/path that specifies the probability that a set of potential routes for the particular net will intersect/use the particular edge/path, wherein a potential route for a particular net traverses the set of sub-regions that contain the particular net's set of pins

[fig. 4; col. 5, line 25 – col. 6; fig. 3, and col. 3; the net 116-118 crosses sub-regions]; and

using the identified edge-intersect/path-use probabilities to identify routes for the nets [col. 5, lines 1-18; the probability use used to form a better routing solution].

11.   Claims 35-37 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12.   The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to disclose either singularly or in combination using the potential routes and the edge-intersect/path-use costs to formulate a linear-programming ("LP") problem; and

solving the LP problem to identify one route for each net.

13.   Applicant's arguments with respect to claims 27-34, and 38-45 with respect to the Wang reference have been considered but are moot in view of the new ground(s) of rejection.

14.   Applicant's arguments, see Amendment D, filed 8/27/03, with respect to Scepanovic '254 have been fully considered and are persuasive. The rejection of record has been withdrawn.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stacy A Whitmore whose telephone number is (703) 305-0565. The examiner can normally be reached on Monday-Thursday, alternate Friday 6:30am - 4:00 pm.
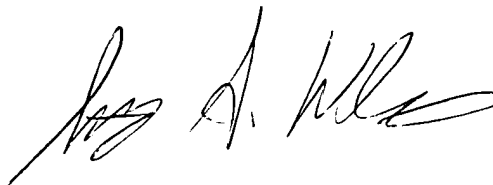
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Stacy A Whitmore
Patent Examiner
Art Unit 2812

SAW